EPIDEMIOLOGY   EPI

Department of Epidemiology and Biostatistics
College of Human Medicine

200   A Multi-disciplinary Approach to Problems in Global Public Health and Epidemiology
Fall. 3(3-0) R: Open to undergraduate students in the Global Public Health and Epidemiology Minor or approval of department.
Overview of global health and the role of epidemiology in studying health problems from a multi-disciplinary perspective.

280   Applied Analytic Methods in Health Studies I
Spring. 3(3-0) P: (EPI 200) and (STT 200 or STT 201 or STT 224 or STT 231 or STT 315 or STT 351 or STT 421) R: Open to undergraduate students in the Global Public Health and Epidemiology Minor or approval of department.
Introduction to conceptual and analytical methods used in Public Health and Epidemiology. Programming, statistical techniques, and interpretation of health data.

289   Independent Study
Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Approval of department.
Faculty supervised, introductory, planned learning for an individual student in areas supplementing regular course offerings.

380   Applied Analytic Methods in Health Studies II
Fall. 3(3-0) P: EPI 280 R: Open to undergraduate students in the Global Public Health and Epidemiology Minor or approval of department.
Topics in conceptual and analytical methods used in Public Health and Epidemiology. Continuation of EPI 280.

390   Disease in Society: Introduction to Epidemiology and Public Health
Spring. 4(4-0) Interdepartmental with Social Science. Administered by Epidemiology.
Human epidemiology and population health issues facing contemporary society. Developed and less-developed settings. Health-related information in the mass media and scholarly publications.

465   Bayesian Statistical Methods
Fall. 3(3-0) A student may earn a maximum of 0 credits none Interdepartmental with Statistics and Probability. Administered by Statistics and Probability. P: STT 442
Probability, belief, and exchangeability. Objective, subjective, and empirical Bayes approaches. Applications to one-parameter models, linear regression models, and multivariate normal models. Hierarchical modeling. Computational methods.

489   Independent Study
Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Approval of department.
Faculty supervised, intermediate-level, planned learning for an individual student in areas supplementing regular course offerings.

490   Advanced Topics/Methods in Global Public Health and Epidemiology
Fall. 3(2-2) P: EPI 390 and EPI 200 and EPI 290 R: Open to undergraduate students in the Global Public Health and Epidemiology Specialization.
Conceptual and analytical methods used in public health and epidemiology.

546   Information Management: Fundamentals of Epidemiology and Biostatistics
Spring. 1(1-0) RB: Undergraduate statistics. R: Open to graduate-professional students in the College of Human Medicine.
Introduction to accessing, analyzing, and applying information to patients and to populations. Offered first ten weeks of the semester.

547   Information Management: Applications of Epidemiology and Biostats
Fall. 1(1-0) P: EPI 546 RB: Undergraduate statistics. R: Open to students in the College of Human Medicine or approval of department.
Basic competency in accessing, analyzing, and applying information to patients and populations.   Offered first half of semester.

805   Readings in the Historical Roots of Epidemiological Thought
Fall. 3(3-0) Interdepartmental with History. Administered by Epidemiology. P: EPI 810 or approval of department R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department.
Historical evolution of models of disease causation and population perspectives on disease.

808   Biostatistics I
Fall. 3(3-0) Interdepartmental with Statistics and Probability. Administered by Epidemiology. RB: College-level algebra. R: Open to master's students or doctoral students in the Epidemiology major or approval of department. SA: STT 425
Applications of probability and statistics in the applied health sciences. Probability distributions, estimation and tests for one-, two-, and paired samples, linear regression, correlation, and ANOVA. Use of statistical software. Critical appraisal of statistical methods in the biomedical literature.

808B   Advanced Biostatistics
Fall. 3(3-0) P: EPI 810 or concurrently or approval of department RB: Linear algebra, calculus. R: Open to graduate students in the Biostatistics Major or in the Epidemiology Major or approval of department.
Fundamental theory of probability and statistical inference related to the practice of public health. Discrete and continuous random variables, sampling distributions, parametric point and interval estimation, hypothesis testing, maximum likelihood estimates, methods of constructing test and estimation procedures. Sample size, power, and efficiency.

809   Biostatistics II
Spring. 3(3-0) Interdepartmental with Statistics and Probability. Administered by Epidemiology. P: EPI 808 RB: MTH 103 or MTH 110 or MTH 116 R: Open to master's students or doctoral students in the Epidemiology major or approval of department. SA: STT 426
Analysis of categorical data in epidemiologic studies. Contingency tables and logistic regression.

810   Introductory Epidemiology
Fall. 3(3-0) R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department. SA: HM 810
Disease from a population perspective as the interaction of host, agent, and environment. Case definition, measuring frequency of disease, mortality and morbidity data, and major study designs.   Offered first half of semester.

812   Causal Inference in Epidemiology
Fall. 3(3-0) P: EPI 810 RB: LCS 829 R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department. SA: HM 812
Causality in epidemiology. Application of theoretical concepts to the design, analysis, and assessment of epidemiologic research.

815   Epidemiology of Cardiovascular Disease
Spring of even years. 3(3-0) RB: EPI 810 R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department. SA: HM 815
Survey of methodologies used in epidemiologic studies of cardiovascular diseases. Review of evidence of genetic, environmental, and behavioral causes of cardiovascular disease.

816   Perinatal Epidemiology
Spring of even years. 3(3-0) RB: EPI 810 R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department. SA: HM 816
Epidemiology of adverse health states in pregnancy and the puerperium. Impact of these health states on subsequent child development.

817   Epidemiology of Communicable Diseases
Fall. 3(3-0) P: EPI 810 or concurrently R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department. SA: HM 817
Application of principles of epidemiology to research in communicable diseases relevant to public health in the U.S. and other countries.

819   Spatial Epidemiology and Medical Geography
Spring. 3(3-0) Interdepartmental with Geography. Administered by Epidemiology. P: EPI 810 or GEO 865 R: Open to graduate students in the Department of Epidemiology and Biostatistics or in the Department of Geography or approval of department. SA: HM 819
Concepts, techniques, and utilization of spatio-epidemiologic analyses for human health.

823   Cancer Epidemiology
Spring of odd years. 3(3-0) P: (EPI 810) and (EPI 809 or EPI 808B) R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department. SA: HM 823
Basic principles of carcinogenesis. Major etiologic factors, types of malignancies, and biomarkers for susceptibility and exposure. Prevention and early detection of cancer.

826   Research Methods in Epidemiology
Fall. 3(3-0) P: EPI 809 R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department. SA: HM 826
Analyses of epidemiologic and clinical data applying statistical methods, based on logistic and survival models, using standard software.

EPI—Epidemiology

826B **Categorical Data Analysis**
Spring. 3(3-0) P: EPI 808B and EPI 810
RB: Knowledge of research design and
quantitative background. R: Open to graduate students in the Biostatistics Major or in
the Epidemiology Major or approval of department.
Applications to real data from clinical and epidemiologic studies of categorical outcomes, distributions for categorical responses and contingency tables, logistic regression and related logit models for binary and multicategory response variables, repeated and clustered categorical data, generalized linear mixed models.

828 **Seminar in Responsible Conduct of Research**
Fall. 1(1-0) P: EPI 810 SA: EPI 827
Ethical and regulatory issues in the responsible conduct of epidemiology research. Topics include informed consent; scientific misconduct; human subjects protection; responsible data management including electronic medical records, biological samples and genetic data; HIPAA compliance; and other current issues of scientific integrity.

829 **Design and Conduct of Epidemiological Studies and Clinical Trials**
Spring. 3(2-2) Interdepartmental with Large Animal Clinical Sciences. Administered by Large Animal Clinical Sciences. P: (VM 533 or EPI 810) and (EPI 808 or EPI 808B)
Applied analytical methods in experimental design. Assessment of health and disease status of animal and human populations. Risk assessment and interpretation of clinical trials.

835 **Neuroepidemiology**
Fall of odd years. 3(3-0) Interdepartmental with Neurology and Ophthalmology. Administered by Epidemiology. P: EPI 810 or approval of department R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department.
Epidemiology of neurologic and neuropsychiatric disorders with emphases on neurodegenerative disorders (e.g., Alzheimer's disease).

836 **Practicum in Epidemiological Methods**
Fall. 3(3-0) P: (EPI 812 or concurrently) and (EPI 826 or concurrently) R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department.
Data management, analysis, interpretation and presentations using public data sets.

840 **Clinical Epidemiology for Healthcare Practice**
Spring. 3 credits. R: Approval of department.
Introduction to clinical epidemiology and evidence-based medicine for clinical practitioners and other healthcare professionals.

847 **Analysis of Survival Data**
Spring of odd years. 3(3-0) Interdepartmental with Statistics and Probability. Administered by Statistics and Probability. RB: STT 422 or STT 442 or STT 862
Analysis of lifetime data. Estimation of survival functions for parametric and nonparametric models. Censored data. The Cox proportional hazards model. Accelerated failure time models. Frailty models. Use of statistical software packages.

851 **SAS Programming I: Essentials**
Fall. 1(1-0) R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department.
A programming approach to plan and write simple SAS programs to solve common data management and data analysis problems.

852 **SAS Programming II: Data Management and Analysis**
Spring. 1(1-0) P: EPI 851 R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department.
A programming approach to plan and write SAS programs to solve common data management and data analysis problems.

853B **Statistical Computing**
Fall. 3(3-0) P: EPI 808B and EPI 826B R: Open to graduate students in the Biostatistics Major or in the Epidemiology Major or approval of department.
Statistical computation and algorithms using programming languages, SAS/IML, R and/or Stata, Newton-Raphson method, Monte Carlo simulation of probability distributions, bootstrap, statistical graphics.

855 **Biostatistical Modeling in Genomic Data Analysis**
Fall. 3(3-0) P: (EPI 808B and EPI 826B) or (EPI 826 or concurrently) R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department.
Introduction to fundamental principles and modeling of genomic /genetic data and computational techniques

856 **Statistical Consulting in Public Health**
Spring. 1(1-0) P: (EPI 826B or EPI 826) and (LCS 829 or concurrently) R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department.
Critical appraisal of applied epidemiological studies, use of real applications to solve design and data analysis problem, and communication of findings to public health researchers, oral/written reports on intermediate and final results of case studies

858 **Clinical Trials**
Spring of even years. 3(3-0) P: (EPI 808B or EPI 809) or (LCS 829 or concurrently) R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department.
Statistical methods for design and analysis of clinical trials and epidemiological studies. Phase I, II, and III clinical trials. Principle of Intention-to-Treat, effects of non-compliance, drop-outs. Interim monitoring of clinical trials and data safety monitoring boards. Meta-analysis. Crossover designs. Sample size and power in clinical trials. Sequential designs.

860 **Advanced Inference for Biostatistics**
Fall. 3(3-0) Interdepartmental with Statistics and Probability. Administered by Epidemiology. P: STT 861 and (STT 862 or concurrently) or approval of department RB: Masters in statistics or biostatistics R: Open to doctoral students in the Department of Epidemiology and Biostatistics or approval of department.
Statistical inference problems with biomedical applications.

880 **Select Topics in Biostatistics**
Summer. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. P: (EPI 808B) or (EPI 808 and EPI 809) or (PHM 830 or STT 464) R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department.
Select topics in biostatistics including global disease distribution and estimation, causal inference, Bayesian methods in health services research.

889 **Applied Epidemiologic Methods for Public Health Practitioners**
Fall of even years. 3(3-0) Interdepartmental with Human Medicine. Administered by Human Medicine. P: HM 802 and HM 803 RB: Academic or professional background in public health and/or public health related discipline R: Open to students in the Public Health major or approval of college.
Identification and conceptualization of public health problems. Generation of testable hypotheses and appropriate data sets. Interpretation of appropriate measures of associations. Evaluation of validity and generalizability of results and ethical issues surrounding the use of humans in epidemiological research. Real case studies are used to analyze study design including the role of chance, bias, misclassification, effect measure modification, interaction, and missing data.

890 **Independent Study in Epidemiology and Biostatistics**
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 12 credits in all enrollments for this course. RB: EPI 810 R: Open to master's students in the Department of Epidemiology and Biostatistics. Approval of department.
Independent study in areas relevant to epidemiology and biostatistics.

899 **Master's Thesis Research**
Fall, Spring, Summer. 1 to 12 credits. A student may earn a maximum of 36 credits in all enrollments for this course. R: Open to master's students in the Department of Epidemiology and Biostatistics. Approval of department. SA: HM 899
Master's thesis research.

910 **Themes in Contemporary Epidemiology**
Spring. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. RB: Master of Science in Epidemiology R: Open to doctoral students in the Epidemiology major.
Discussion and critique of important contemporary themes in epidemiology as reflected in current publications in the field.

919 **COVID-19 Epidemiology and Public Health**
Fall, Spring, Summer. 3(3-0) R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department.
Application of epidemiologic and public health principles to COVID-19.

920 Advanced Methods in Epidemiology and Applied Statistics
Spring. 3(3-0) Interdepartmental with Statistics and Probability. Administered by Epidemiology. P: (EPI 826B or concurrently) or EPI 826 or approval of department R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department.

Pattern recognition and cluster analysis, longitudinal data analysis, path analysis, repeated measures and time-series analysis.

935 Research Seminar
Summer. 3(3-0) P: EPI 810 and EPI 812 and LCS 829 RB: Master of Science in Epidemiology or equivalent.

Conceptualization, development, and writing of research proposals in epidemiology and other forms of clinical field research.

950 Advanced Biostatistical Methods in Epidemiology
Fall of even years. 3(3-0) P: (EPI 826 or concurrently) or EPI 826B RB: Calculus, linear algebra, regression, experimental designs. R: Open to students in the Department of Epidemiology and Biostatistics or approval of department.

Study of specific biostatistical methods and epidemiology applications.

952 Duration and Severity Analysis
Spring of odd years. 3(3-0) P: (EPI 826B or concurrently) or EPI 826 or approval of department RB: Calculus, linear and logistic regressions. R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department.

Analysis of data that involve time to occurrence of a single event or multiple durations between occurrences of several events; modeling techniques; survival analysis in clinical and public health studies; frailty models; experimental and non-experimental applications using major statistical software.

953 Analytical Strategies for Observational Studies
Fall of odd years. 3(3-0) P: (EPI 826 or concurrently) or EPI 826B RB: Calculus, linear and logistic regressions R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department.

Models and methods such as propensity scores, instrumental variables, regression discontinuity design, discrete choice analysis, and marginal structural models. Examples will be demonstrated with procedures in major statistical software.

977 Social Epidemiology
Fall of even years. 3(3-0) Interdepartmental with Sociology. Administered by Epidemiology. P: EPI 810 or approval of department RB: (LCS 829 or EPI 812) or equivalent R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department.

Introduction to the field of social epidemiology and the social determinants of health. Contemporary theoretical and methodological issues in social epidemiology.

979 Advanced Topics in Infectious Disease Epidemiology
Spring of even years. 3(3-0) RB: EPI 817 R: Open to graduate students in the Department of Epidemiology and Biostatistics or approval of department.

Epidemiological and public health perspectives on the etiology, transmission and prevention of infectious diseases. Key conceptual and methodological issues associated with studying infectious diseases from molecular and population based perspectives.

990 Independent Study
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Open to doctoral students in the Epidemiology Major. Approval of department.

Special projects, directed reading, and research arranged by an individual graduate student and a faculty member in areas supplementing regular course offerings.

999 Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 24 credits in all enrollments for this course. R: Open to doctoral students in the Epidemiology major.

Doctoral dissertation research.